Final Report

A Comparative Analysis of Achievement by Native Americans in Montana

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This report describes results from analysis of the Spring 2001 Montana State Testing Program pertaining to the performance of Native Americans. Throughout the report, comparisons are made between the performance of Native Americans and other groups in Montana and the United States, but emphasis is on using the comparisons to understand how to improve Native American education in Montana schools.

The academic performance of Native American students historically has been lower than that of white students and even other ethnic minorities. Socioeconomic factors that contribute to this achievement gap include poverty, substance abuse, and parents' lack of formal education. Native Americans also have the highest teen suicide rate (four times the national average in Montana), the shortest life expectancy of any ethnic group, are the most poorly nourished, and are more likely to live in substandard housing. Pavel (1995) reported that 55 percent of principals at Bureau of Indian Affairs (BIA) and tribal schools described parental substance abuse as a serious problem at their school, compared to 6 percent of principals at schools with low Native American enrollment. A survey of seven reservations in Montana, for example, found that 33 percent of 9- to 12-year-olds were regular drinkers (Trimble et al,1987). In addition, teacher staffing issues were much more likely to plague BIA schools than public schools.

During the first four years of school, Native American students perform just below the national average, but their performance drops after fourth grade (Trent and Gilman,1985). NAEP test results for 1998, for example, show a decease from grade 4 to

grade 8 in the percent of Native Americans in Montana scoring at the Proficient level and above. This pattern will be illustrated in greater detail with results from the *Iowa Tests of Basic Skills* (Hoover, Dunbar & Frisbie, 2001) and the *Iowa Tests of Educational Development* (Forsyth, Ansley, Feldt & Alnot, 2001).

The dropout rate for Native Americans is the highest of any ethnic group in the United States, 50 percent, and may reach 65 percent (Hill, 1991). The most common time to drop out is ninth or tenth grade, according to a study of Oklahoma City public schools (McBee, 1986). An underrepresentation of Native American students in college prep curriculum and advanced math classes has also been documented (Taylor, 1983).

Snetzler & Qualls Snetzler and Qualls (2000) examined differences between native and non-native English speakers of equal ability levels on a standardized achievement test. They compared *Iowa Tests of Basic Skills* scores for Native Alaskans and Caucasian students across time: at 4th and 6th grade for one group and at 6th and 8^{the} grade for another group. The Native Alaskan students were classified as limited English, bilingual, or English proficient. These researchers found the effect size for the ethnic comparison was about twice as big as the effect size for the language comparison. Differential item functioning favoring one ethnic group or another was sporadic, however, and tended to balance out across tests. The effect size for the language comparison decreased over time, suggesting that as students became more familiar with written English, test scores improved.

According to Luftig (1983), the underachievement of Native American students reflects in part the alienation they feel in a traditional classroom setting, which contrasts

sharply with cultural values. The learning style of Native Americans tends to be global, intuitive, and holistic (Van Hamme, 1996), whereas sequential, logical, deductive reasoning is often required for academic success. The Native American culture values communicative reticence, but in a traditional classroom setting, such a demeanor is likely to be interpreted as unmotivated, uninvolved, and passive. These cultural conflicts may contribute to a perception among Native American students that classroom experiences are irrelevant to their future. To understand the potential significance of such factors to Native American education in Montana, evidence about the general achievement of Native American students is needed. Such evidence has been unavailable on a statewide basis.

Method

Data Source. This analysis used data from the Spring 2001 Montana State Testing Program. Students in grades 4, 8, and 11 took the *Iowa Tests of Basic Skills* (*ITBS*, grades 4 and 8) or the *Iowa Tests of Educational Development* (*ITED*, grade 11) in the Spring 2001 Montana State Testing Program. These standardized achievement tests report student achievement on a scale of developmental standard scores and a scale of national percentile ranks. The latter scale is based on norms established in the Spring 2000 national standardization of the *ITBS* and *ITED*.

Two samples of student data records were used for the analyses in this report. The first consisted of Caucasian and American Indian students enrolled in grades 4, 8, and 11 in the Montana public schools in 2001 who participated in testing. This included approximately 33,000 students of which about 10% were Native American. A second

sample was created from the first sample by identifying the majority population (either Caucasian or Native American) in each school building. Within each school, all students in the minority population and an equal number of randomly drawn students from the majority population were selected for the second sample. The second sample contained slightly more than 4,000 students, approximately 2,000 Caucasians and 2,000 Native Americans.

Group differences in test performance can be examined in different ways depending on the purpose. Sometimes it is important simply to document the magnitude of group differences for descriptive purposes, for example, to understand an achievement gap in a state or local school district. The total state sample is appropriate for this purpose. Other times interest exists in making an inference about factors that influence group differences, such as curriculum, resources, school environment, or student background. The total state sample is not appropriate for this purpose because differences between Caucasians and Native Americans in that sample are confounded with curriculum and other school effects. The matched sample, to the extent that it controls for curriculum and other school effects by including equal numbers of Caucasians and Native Americans within the same building, is preferable when the purpose is to isolate the cause of an achievement gap.

Procedures. Group differences in achievement on individual test items and on subtests of the *ITBS* and *ITED* were examined. At the item level, standard procedures for the analysis of differential item functioning (DIF) were used. DIF identifies items that function differently for two groups of examinees with the same total test score. The method used to identify items exhibiting DIF is based on the Mantel-Haenszel

procedure. Holland and Thayer (1988) translated the common odds ratio produced by the Mantel-Haenszel procedure into a symmetric scale that estimates the presence and magnitude of DIF for individual items. The computational details of the procedure are beyond the scope of this report; however, the definition of DIF is related to the aggregate difference between percent correct on an item for Caucasians and Native Americans with the same total score. Test developers routinely use this procedure to identify DIF between reference and focal groups. All items on final forms of the *ITBS* and the *ITED* are screened for DIF using the Mantel-Haenszel procedure during item tryouts.

In practice, test developers evaluate DIF for both statistical significance and magnitude of the difference. In this study, items were classified for DIF with the combination of these factors used by the National Assessment of Educational Progress (NAEP) described in Zieky (1993). The identified items exhibit DIF that is statistically significant and large enough to influence comparisons of average Caucasian and Native American achievement in Montana. This method was also used in selecting items for the *ITBS* and *ITED*.

Average differences between Caucasian and Native American *ITBS* and *ITED* standard scores were analyzed in two ways. These differences were converted into a statistic called an effect size. The effect size indicates the magnitude of a difference between groups in units that are comparable across tests and grades. In this report, it is defined as the difference between group means (e.g. Caucasian minus Native American) divided by the standard deviation in the national standardization sample.

Average differences were also converted to national percentile rank (NPR) units because that metric is commonly used to report results in Montana.

Results

Differential Item Functioning. The results of the DIF analyses are summarized in Table 1, which categorizes items in each test area for the presence or absence of DIF. The number of items flagged for DIF was generally small at all grades and in all test areas and was similar in the matched and unmatched samples. The small number of flagged items probably stems from DIF screening during the development of the *ITBS* and *ITED*. Items that portray situations unfamiliar to most students because of social or cultural factors were revised or removed from the pool considered for field testing. Educators representing African-Americans, Caucasians, Hispanic Americans, Native Americans, and Asian Americans also evaluated items for perceived fairness and cultural sensitivity as well as for balance in regional, urban-rural, and male-female representativeness. Based on these reviews and the statistical analysis of DIF, items identified by reviewers as problematic were either revised to eliminate objectionable features or eliminated from consideration for the final forms. This process has an impact on subsequent DIF analyses of published forms of the test.

Results from the first sample identified four of 402 items that exhibited DIF in grade 4, 11 of 515 items in grade 8, and seven of 378 items in grade 11. These items tended to be found in subtests such as Vocabulary, Reading, and Language Usage, in grade 4; Vocabulary, Reading, Language Usage, and Sources of Information in grade 8; and Concepts and Problem-Solving in grade 11.

Most items flagged for DIF favored Caucasian students. In general, Native Americans who answered flagged items incorrectly chose the available distractors with about equal frequency. This finding is more characteristic of random guessing than of specific misconceptions about the concept presented in the item. Caucasians who answered the same item incorrectly were more likely to choose one distractor over the others. An exception to this tendency was in Usage and Expression, where the items flagged for DIF showed that Native Americans were more likely than Caucasians to select the "*No Mistakes*" option. Sentences with double negatives, such as "wasn't no," or with incorrect verb forms, such as "I seen," were flagged for DIF, meaning that for students with the same total score, these items were harder for Native Americans than for Caucasians.

DIF items in specific grades included Math Concepts at grade 4, Reference Materials at grade 8, and Computation at grade 11. In grade 4, the item flagged for DIF in Math Concepts concerned probability. Responses of Native Americans tended to be evenly split among the four options, which indicates that students could not narrow the choice to the one or two that seemed most reasonable. In grade 8, two items in the Reference Materials test were flagged for DIF. Both asked students to select the best keyword for a library or Internet search. In grade 11, the four items identified for DIF in Computation required multiple steps to find a solution. For example, one of the items required subtraction using negative numbers, whereas another item required students to both simplify an expression and divide. These items would be difficult for students who couldn't manipulate or simplfy algebraic expressions. They stand out in a DIF

analysis because relatively few items of this type are included in the total score on which students are matched.

Similar results were found for the matched sample, although the number of items favoring Native Americans was larger than in the unmatched sample. One of six DIF items at grade 4, two of five at grade 8; and four of eight at grade 11 favored Native Americans. In grade 4, the DIF items identified in the unmatched sample were the same items identified in the matched sample. In grade 8, the DIF items identified for the matched sample had also been identified as DIF items for the unmatched sample; however, there were five fewer items flagged for DIF in the matched sample than in the unmatched sample. In the grade 11 matched sample, five additional items were flagged for DIF, two in Vocabulary, one in Reading Comprehension, one in Computation, and one in Science. The fact that matching students by school building had a negligible effect on the DIF analysis may be due to screening for DIF during test development.

Had the DIF analysis flagged a substantial number of items in a test area, differences between mean performance of Caucasians and Native Americans in that area would be difficult to interpret. Given the results presented in Table 1, however, analysis of the discrepancy between Caucasian and Native American achievement in the state can proceed without a concern that test “bias” or item appropriateness has an undue influence on test scores.

Achievement Gap. The Montana achievement gap was analyzed by comparing the average performance of Caucasians and Native Americans in each major test area at each grade. Results for the total state sample are presented first in Tables 2 through

4 for descriptive purposes. The statistics in these tables are based on the entire Spring 2001 administration of The Iowa Tests in Montana and on the Spring 2000 national standardization of the *Iowa Tests of Basic Skills* (*ITBS*) and *Iowa Tests of Educational Development* (*ITED*). Tables 5 and 6 give mean comparisons in terms of effect sizes and NPRs, respectively. Tables 7 though 11 report results for the matched samples.

Tables 2 through 4 show that in each test area at each grade, the average achievement of Caucasians in Montana is substantially higher than that of students nationally. Math Computation was the only test on which the Montana Caucasian average was not considerably higher than the national average (202.0 versus 200.7 in grade 4; 252.8 versus 251.3 in grade 8). Tables 2 through 4 also show that the average achievement of Native Americans in Montana was lower than that of students nationally and substantially lower than that of Caucasians in the state. Clearly, the size of the Native American achievement gap depends on the comparison group. Two comparison groups are included to provide a broader context for understanding the gap.

Effect sizes in grades 4, 8, and 11 for the Spring 2001 program are given in Table 5. Two effect sizes are given for each test and grade, one using Montana Caucasians as the comparison group and the other using students nationally as the comparison group. The effect size is larger when comparing Native Americans to Caucasians in Montana than when comparing them to students in the national standardization sample. Grade-level trends indicate that the achievement gap between Native Americans in Montana and students nationally widens between grade 4 and grade 8. For example, looking at the Core Total, the effect size is .30 at Grade 4 and .51 at Grade 8. This pattern exists for total scores in Reading (.30 in grade 4, .45 in grade

8), in Language (.23 in grade 4, .42 in grade 8), and in Math (.39 in grade 4, .59 in grade 8). The effect size declines in grade 11 (.24, .24, and .31 for Reading, Language, and Math, respectively; .27 for Core Total), although the decline is due in part to low-achieving Native American students dropping out of school and not taking the test. About 40 percent fewer students took the test in grade 11 as did in grade 8.

Many of the effect sizes in Table 5 are similar in magnitude across tests and grades. Generally speaking, Native Americans in Montana scored .5 to .8 standard units below Caucasians in Montana and .2 to .5 standard units below students nationally. Effect sizes were smallest in Spelling, Computation, and Maps and Diagrams. This is consistent with historical data from other tests given to Native Americans in Montana. Small differences in spelling and computation are generally consistent with effect size data comparing the achievement of racial or ethnic minorities to that of the majority culture. Effect sizes in of .5 to .8 standard units are quite common.

Table 6 translates the Native American achievement gap into national percentile ranks (NPRs). Percentile ranks indicate the relative standing of a student in comparison to a particular norm group. For each grade, two columns provide comparisons between (a) Native American students in Montana and Caucasian students in Montana and (b) Native American students in Montana and students nationally. Using 4th grade Core Total as an example, Caucasians in Montana scored better than 64 percent of the students nationally, whereas Native Americans scored better than 40 percent. Thus, Caucasians scored better than an additional 24 percent of students nationally. This is the achievement gap between Native Americans and Caucasians in Montana

expressed in NPRs. The achievement gap on Core Total between Native Americans in Montana and students nationally is smaller.

The results in Table 6 illustrate an increase in the achievement gap between grade 4 and grade 8 in nearly every test area. The NPR gap between Native Americans and students nationally increases by five percentile points in Reading and Language, four percentile points in Math, and nine percentile points on Core Total. The results also show the decrease in the achievement gap between grade 8 and grade 11. The decrease is five percentile points in Reading, six in Language, 11 in Math, and 10 on Core Total. For the Composite, an average of all tests in the *ITBS* and *ITED* batteries, the achievement gap is nine percentile points in grade 4, 15 in grade 8, and four in grade 11. In terms of general achievement, Native Americans statewide who remained in school through the eleventh grade performed four percentile points lower than the national average.

The remaining tables, Tables 7 through 11, repeat the previous analyses using a subset of the full Montana sample from schools with a mixed population of Caucasians and Native Americans (most BIA schools, for example, are not included). This matched sample consisted of equal numbers of Caucasian and Native American students from the same school. The means in Tables 7 through 9 show Caucasians in the matched sample to have slightly lower means and Native Americans to have moderately higher means than their unmatched counterparts statewide. This trend translates to smaller effect sizes and smaller differences between national percentile ranks shown in Tables 10 and 11.

Tables 10 and 11 indicate that differences between the two groups are not as great when factors associated with curriculum and school environment are taken into account. The effect sizes in Table 10 range from about zero to .4 for comparisons with national norms, and from about .2 to .5 for comparisons with Montana Caucasians. These translate to NPR differences of about 1 to 15 and 0 to 18 percentile rank points, respectively. Several comparisons in these tables show Montana Native Americans on the average to outperform students nationally. In particular, Native Americans in schools with mixed populations who remain in school through grade 11 exceeded the national average on the ITED composite score by two percentile points.

Discussion

Special samples are sometimes constructed to isolate factors that contribute to an achievement gap if the purpose of disaggregation is to gain insight into such factors. School resources, curriculum, and general opportunity to learn all contribute to the differences documented in this report. To equalize these factors, Native Americans and Caucasians were matched by school building. Effect sizes would only be smaller in the matched sample if uncontrolled factors actually contributed to the achievement gap. In Montana, evidence indicates they do.

As noted at the beginning of this report, comparative results on student achievement are useful only to the extent that they stimulate discussions of the ultimate causes of an achievement gap such as the one between Native Americans and other students in Montana. The results in this report strongly suggest that Native Americans benefit from the additional human and material resources that exist in schools with

mixed populations. They also suggest that Native Americans benefit from additional time in school. These facts should focus attention on factors outside the school that influence retention rates and opportunity to learn, as well as encourage teachers and students to do their part to improve instruction and learning.

Table 1

DIF Item Counts by Content Area

Montana Caucasians versus Native Americans

ITBS and *ITED*, Form A

	Reading	Language	Math	Science	Social Studies	Sources of Information
4th Grade						
No DIF	74 (72)	115	86	34	34	55
Favors Caucasians	1 (2)	2	1	0	0	0
Favors Native Americans	0 (1)	0	0	0	0	0
8th Grade						
No DIF	90 (93)	149 (150)	113	43	43	66 (68)
Favors Caucasians	3 (0)	4 (2)	0	0	0	3 (1)
Favors Native Americans	1	0 (1)	0	0	0	0
11th Grade						
No DIF	83 (81)	85	65 (67)	48 (47)	50	40
Favors Caucasians	1	0	5 (3)	0	0	0
Favors Native Americans	0 (2)	1	0	0 (1)	0	0

Note. Numbers in parentheses represent the DIF counts for the matched sample of Caucasian and Native American students where these numbers are different from the total sample.

Table 2

Group Means for Grade 4

Montana Caucasian and Native American, and National Standardization

Iowa Tests of Basic Skills, Form A

Test Area	Caucasian	Native American	National
Vocabulary	208.7	192.0	199.9
Reading Comprehension	215.0	195.6	202.6
Reading Total	**211.9**	**193.9**	**201.2**
Spelling	206.6	197.8	202.5
Capitalization	217.4	197.4	204.0
Punctuation	216.4	198.2	204.9
Usage & Expression	220.7	197.1	204.9
Language Total	**215.3**	**197.7**	**204.1**
Concepts & Estimation	206.3	191.8	200.4
Problem Solving & Data Interpretation	211.6	194.2	202.6
Computation	202.0	192.7	200.7
Math Total	**206.6**	**193.1**	**201.3**
Core Total	**211.4**	**195.3**	**202.2**
Social Studies	213.7	196.5	202.6
Science	217.3	197.3	203.5
Maps & Diagrams	217.4	200.0	204.1
Reference Materials	212.1	198.1	203.2
Sources of Information Total	**214.8**	**199.1**	**203.6**
Composite	**213.4**	**196.9**	**202.7**

Table 3

Group Means for Grade 8

Montana Caucasian and Native American, and National Standardization

Iowa Tests of Basic Skills, Form A

Test Area	**Caucasian**	**Native American**	**National**
Vocabulary	258.3	233.2	248.7
Reading Comprehension	263.9	233.9	248.9
Reading Total	**261.1**	**233.6**	**248.8**
Spelling	254.5	239.5	251.2
Capitalization	265.1	232.9	251.7
Punctuation	265.1	231.9	252.4
Usage & Expression	268.1	229.3	251.5
Language Total	**263.3**	**233.6**	**251.7**
Concepts & Estimation	261.3	231.0	250.4
Problem Solving & Data Interpretation	266.7	232.6	250.9
Computation	252.8	230.0	251.3
Math Total	**260.3**	**231.3**	**250.9**
Core Total	**261.7**	**233.2**	**250.5**
Social Studies	265.4	233.3	250.6
Science	271.2	238.6	251.5
Maps & Diagrams	273.6	242.2	251.7
Reference Materials	265.0	234.6	251.9
Sources of Information Total	**269.3**	**238.4**	**251.8**
Composite	**265.3**	**235.2**	**250.9**

Table 4

Group Means for Grade 11

Montana Caucasian and Native American, and National Standardization

Iowa Tests of Educational Development, Form A

Test Area	**Caucasian**	**Native American**	**National**
Vocabulary	285.3	257.9	272.6
Reading Comprehension	296.7	268.7	273.0
Reading Total	**291.0**	**263.5**	**272.8**
Spelling	279.2	265.5	274.9
Language Total	**293.9**	**263.3**	**274.3**
Concepts & Problem Solving	294.6	265.3	273.9
Computation	279.6	254.9	273.3
Math Total	**289.8**	**261.9**	**273.7**
Core Total	**291.9**	**263.6**	**273.6**
Social Studies	298.3	269.9	273.3
Science	301.6	274.8	273.8
Sources of Information	**295.7**	**269.9**	**274.4**
Composite	**295.5**	**267.9**	**273.7**

Table 5

Effect Sizes for Grades 4, 8, and 11

ITBS and *ITED*, Form A

Test Area	**Grade 4**		**Grade 8**		**Grade 11**	
Vocabulary	.71	.34*	.81	.50*	.78	.42*
Reading Comprehension	.68	.24	.72	.36	.59	.09
Reading Total	**.74**	**.30**	**.81**	**.45**	**.72**	**.24**
Spelling	.35	.19	.42	.33	.34	.23
Capitalization	.55	.18	.64	.37		
Punctuation	.53	.19	.64	.40		
Usage & Expression	.68	.23	.74	.42		
Language Total	**.62**	**.23**	**.70**	**.42**	**.66**	**.24**
Concepts & Estimation	.64	.38	.90	.58	.71	.21
Problem Solving & Data Interpretation	.62	.31	.81	.43		
Computation	.45	.39	.62	.58	.59	.44
Math Total	**.64**	**.39**	**.87**	**.59**	**.74**	**.31**
Core Total	**.70**	**.30**	**.85**	**.51**	**.77**	**.27**
Social Studies	.65	.23	.76	.41	.61	.07
Science	.68	.21	.77	.30	.57	-.02
Maps & Diagrams	.56	.13	.69	.21		
Reference Materials	.56	.20	.76	.43		
Sources of Information Total	**.60**	**.17**	**.78**	**.34**	**.58**	**.10**
Composite	**.69**	**.24**	**.85**	**.45**	**.71**	**.15**

*Effect sizes in these columns compare Native Americans in Montana to students nationally.

Table 6

Differences in National Percentile Rank for Grades 4, 8, and 11

ITBS and *ITED*, Form A

Test Area	**Grade 4**		**Grade 8**		**Grade 11**	
Vocabulary	26	13*	30	18*	31	16*
Reading Comprehension	25	11	26	13	23	4
Reading Total	**25**	**10**	**27**	**15**	**28**	**10**
Spelling	14	8	15	11	12	8
Capitalization	22	8	20	12		
Punctuation	20	9	21	13		
Usage & Expression	25	10	24	14		
Language Total	**22**	**9**	**23**	**14**	**22**	**8**
Concepts & Estimation	27	16	31	20	24	7
Problem Solving & Data Interp.	25	14	25	14		
Computation	18	15	22	20	19	14
Math Total	**25**	**16**	**29**	**20**	**23**	**9**
Core Total	**24**	**10**	**29**	**19**	**25**	**9**
Social Studies	24	10	24	14	22	2
Science	24	9	27	12	22	-1
Maps & Diagrams	19	5	25	9		
Reference Materials	20	8	25	15		
Sources of Information Total	**20**	**7**	**25**	**11**	**20**	**3**
Composite	**22**	**9**	**28**	**15**	**23**	**4**

*Effect sizes in these columns compare Native Americans in Montana to students nationally.

Table 7

Group Means for Grade 4

Matched Samples, Montana Caucasian and Native American Students

Iowa Tests of Basic Skills, Form A

Test Area	**Caucasian**	**Native American**	**National**
Vocabulary	206.2	196.5	199.9
Reading Comprehension	211.1	200.1	202.6
Reading Total	**208.6**	**198.4**	**201.2**
Spelling	203.7	199.0	202.5
Capitalization	214.5	201.7	204.0
Punctuation	213.1	202.6	204.9
Usage & Expression	216.8	203.3	204.9
Language Total	**212.0**	**201.7**	**204.1**
Concepts & Estimation	204.2	195.8	200.4
Problem Solving & Data Interpretation	208.3	199.3	202.6
Computation	199.8	195.3	200.7
Math Total	**204.1**	**196.9**	**201.3**
Core Total	**208.4**	**199.2**	**202.2**
Social Studies	210.7	201.6	202.6
Science	214.2	202.9	203.5
Maps and Diagrams	215.0	204.8	204.1
Reference Materials	209.6	202.1	203.2
Sources of Information Total	**212.3**	**203.5**	**203.6**
Composite	**210.4**	**201.2**	**202.7**

Table 8

Group Means for Grade 8

Matched Samples, Montana Caucasian and Native American Students

Iowa Tests of Basic Skills, Form A

Test Area	**Caucasian**	**Native American**	**National**
Vocabulary	255.8	240.9	248.7
Reading Comprehension	259.6	242.1	248.9
Reading Total	**257.8**	**241.6**	**248.8**
Spelling	250.5	242.9	251.2
Capitalization	260.3	241.1	251.7
Punctuation	259.8	239.9	252.4
Usage & Expression	262.5	239.2	251.5
Language Total	**258.6**	**240.9**	**251.7**
Concepts & Estimation	256.1	239.1	250.4
Problem Solving & Data Interpretation	260.9	241.4	250.9
Computation	248.1	235.0	251.3
Math Total	**255.1**	**238.6**	**250.9**
Core Total	**257.4**	**240.6**	**250.5**
Social Studies	260.2	242.2	250.6
Science	265.0	246.5	251.5
Maps & Diagrams	268.7	250.3	251.7
Reference Materials	261.0	243.3	251.9
Sources of Information Total	**265.1**	**246.8**	**251.8**
Composite	**260.8**	**243.0**	**250.9**

Table 9

Group Means for Grade 11

Matched Samples, Montana Caucasian and Native American Students

Iowa Tests of Educational Development, Form A

Test Area	**Caucasian**	**Native American**	**National**
Vocabulary	279.7	266.7	272.6
Reading Comprehension	291.5	276.7	273.0
Reading Total	**285.7**	**271.8**	**272.8**
Spelling	277.1	270.0	274.9
Language Total	**287.8**	**271.6**	**274.3**
Concepts & Problem Solving	289.1	274.7	273.9
Computation	275.4	261.6	273.3
Math Total	**284.7**	**270.3**	**273.7**
Core Total	**286.5**	**272.1**	**273.6**
Social Studies	293.9	278.0	273.3
Science	297.7	280.9	273.8
Sources of Information	**291.1**	**277.6**	**274.4**
Composite	**290.9**	**275.9**	**273.7**

Table 10

Effect Sizes for Grades 4, 8, and 11

Matched Samples, Montana Caucasian and Native American Students

ITBS and *ITED*, Form A

Test Area	**Grade 4**		**Grade 8**		**Grade 11**	
Vocabulary	.41	.15*	.48	.25*	.37	.17*
Reading Comprehension	.38	.09	.42	.16	.31	-.08
Reading Total	**.42**	**.11**	**.48**	**.21**	**.36**	**.03**
Spelling	.19	.14	.21	.23	.18	.12
Capitalization	.35	.06	.38	.21		
Punctuation	.31	.07	.39	.24		
Usage & Expression	.39	.05	.44	.23		
Language Total	**.36**	**.08**	**.42**	**.25**	**.35**	**.06**
Concepts & Estimation	.37	.20	.51	.34	.35	-.02
Problem Solving & Data Interpretation	.32	.13	.46	.22		
Computation	.22	.26	.36	.44	.33	.28
Math Total	**.34**	**.21**	**.50**	**.37**	**.38**	**.09**
Core Total	**.40**	**.13**	**.50**	**.29**	**.39**	**.04**
Social Studies	.35	.04	.43	.20	.34	-.10
Science	.39	.02	.44	.12	.36	-.15
Maps & Diagrams	.33	-.02	.40	.03		
Reference Materials	.30	.04	.44	.21		
Sources of Information Total	**.34**	**.00**	**.46**	**.13**	**.30**	**-.07**
Composite	**.39**	**.06**	**.51**	**.22**	**.39**	**-.06**

Table 11

Differences in National Percentile Rank for Grades 4, 8, and 11

ITBS and *ITED*, Form A

Test Area	**Grade 4**		**Grade 8**		**Grade 11**	
Vocabulary	16	6*	16	9*	16	7*
Reading Comprehension	14	4	16	6	12	-3
Reading Total	15	4	17	8	15	2
Spelling	7	6	8	8	6	4
Capitalization	15	3	12	7		
Punctuation	10	2	13	8		
Usage & Expression	14	2	14	7		
Language Total	12	2	15	9	11	1
Concepts & Estimation	16	9	18	12	11	-1
Problem Solving & Data Interpretation	12	5	15	8		
Math Computation	7	9	12	15	10	9
Math Total	**12**	**8**	**16**	**12**	**13**	**3**
Core Total	**13**	**5**	**16**	**11**	**14**	**2**
Social Studies	11	1	14	7	13	-4
Science	13	1	15	5	14	-6
Maps & Diagrams	10	-2	14	2		
Reference Materials	11	2	15	8		
Sources of Information Total	10	0	15	4	10	-3
Composite	12	3	17	7	13	-2

*Effect sizes in these columns compare Native Americans in Montana to students nationally.

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